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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/669,007

09/24/2003

Rie Sato

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75694

7590

07/22/2009

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WASHINGTON, DC 20006

EXAMINER

CHIU, TSZ K

ART UNIT

PAPER NUMBER

2822

NOTIFICATION DATE

DELIVERY MODE

07/22/2009

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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<b>Office Action Summary</b>	<b>Application No.</b> 10/669,007	<b>Applicant(s)</b> SATO ET AL.	
	<b>Examiner</b> Tsz K. Chiu	<b>Art Unit</b> 2822	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 01 April 2009.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Drawings***

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "magnetic flux guide magnetically coupled with the magnetization free layer" must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 1-5 and 7, 8, 10, and 11 are rejected under 35 U.S.C. 102(a) as being anticipated by Hujanen et al. (20020076837).

In re claims 1, 7 and 10, Hujanen discloses

an emitter (16)

a collector (12) formed adjacent to the emitter (16)

a base (41) formed between the emitter (16) and the collector (12) and having a magnetization pinned layer (34) of ferromagnetic material, a magnetization free layer (38) of ferromagnetic material and a nonmagnetic layer (36) between the magnetization pinned layer (34) of ferromagnetic material and the magnetization free layer (38) of ferromagnetic material, the magnetization pinned layer (34) having a magnetization substantially fixed in an applied magnetic field, the magnetization free layer (38) having a magnetization substantially free to rotate under the applied magnetic field,

and the nonmagnetic layer (36) being configured to decouple exchange coupling between the magnetization free layer (38) of ferromagnetic material and the magnetization pinned layer (34) of ferromagnetic material, the base (41) including an electrode (44) configured to apply a voltage between the emitter (16) and the base (41);  
and

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a tunnel barrier layer (14) of anti-ferromagnetic material formed between the magnetization pinned layer (34) of ferromagnetic material and the emitter (16) or between the collector (12) and the magnetization pinned layer (34) of ferromagnetic material and provided with an exchange coupling with a adjoining on of the magnetization pinned layer (34) of ferromagnetic material, the tunnel barrier layer (14) being dielectric and tunnel conductive, and the magnetization of the magnetization pinned layer (34) of ferromagnetic material being fixed by the exchange coupling between the magnetization pinned layer (34) of ferromagnetic material and the tunnel barrier of anti-ferromagnetic material.

With respect to claim 2, Hujanen discloses

the antiferromagnetic material is cobalt oxide iron oxide, and nickel oxide.

(paragraph 35-37)

With respect to claim 3, Hujanen discloses a dielectric layer of nonmagnetic material formed in contact with the tunnel barrier layer (14) of antiferromagnetic material.

With respect to claim 4, Hujanen discloses the magnetization pinned layer (34) includes a metal selected from the group consisting of Fe, Co, Ni or an alloy containing the metal and the tunnel barrier layer (14) of antiferromagnetic material contains an oxide of the metal. (paragraph 40)

With respect to claim 5, Hujanen discloses the tunnel barrier of antiferromagnetic material is formed between the magnetization pinned layer (34) and the emitter (16) and

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the emitter (16) include a semiconductor surface contacting the tunnel barrier layer (14) of the antiferromagnetic material.

With respect to claims 8 and 11, Hujanen discloses the collector (12) electrically coupled with an electrical field effect transistor and the spin-tunnel transistor and the electrical field effect transistor are formed on the same substrate.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hujanen et al. (20020076837) in view of Katti et al. (6707084).

With respect to claim 6, Hujanen discloses another tunnel barrier layer of nonmagnetic dielectric material formed in contact with the magnetization free layer (38) of ferromagnetic material.

However, Hujanen did not disclose another tunnel barrier layer of nonmagnetic dielectric material formed in contact with the magnetization free layer.

Katti discloses another tunnel barrier layer (502) of nonmagnetic dielectric material formed in contact with the magnetization free layer.

Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to include another tunnel barrier layer which improves switching reliability. (column 6, lines 20-37)

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Claims 9 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hujanen et al. (20020076837) in view of Watanabe et al. (20010040777).

With respect to claims 9 and 12, Hujanen discloses the magnetization free layer (38).

However, Hujanen did not disclose a magnetic flux guide.

Watanabe discloses a magnetic flux guide.

Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to include a magnetic flux guide to improve and ensure high sensitivity and high stability. (Abstract, page 1)

### ***Response to Arguments***

Applicant's arguments with respect to claims 1-12 have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tsz K. Chiu whose telephone number is 571-272-8656. The examiner can normally be reached on 0800 to 1700.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra V. Smith can be reached on 571-272-2429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Zandra V. Smith/  
Supervisory Patent Examiner, Art  
Unit 2822

/Tsz K Chiu/  
Examiner, Art Unit 2822  
July 19, 2009